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$\Gamma_{\text{eff}}^{(2)} = \Gamma_{\text{eff}}^{(2)}(\text{free}) + \Gamma_{\text{eff}}^{(2)}(\text{loop})$

3. A thin film measuring apparatus according to Claim 1 comprising a X-ray measurement apparatus for measuring X-ray reflectivity,

wherein the X-ray irradiation unit has a X-ray incident angle for allowing the X-ray to impinge on the thin film on the surface of the thin film deposition

$\frac{d}{dt} \left( \frac{\partial L}{\partial \dot{x}} \right) = \frac{\partial L}{\partial x}$

5. A thin film measuring method using the thin film measuring apparatus according to Claim 4, wherein measuring intervals with the thin film measuring apparatus is shortened based on the basic information as deposition of the thin film comes to its end.

a closed thin film deposition furnace having a X-ray permeable X-ray incidence window and X-ray extraction window;

substrate supporting means for supporting a thin film

deposition substrate in the thin film deposition furnace at a position for allowing the thin film deposition particles of the thin film deposition substance generated from the thin film substance generating means to adhere on the surface of the substrate;

a X-ray irradiation unit provided at the outside of the thin film deposition furnace and irradiating a X-ray through the X-ray incidence window toward the surface of the thin film deposition substrate supported in the thin film deposition furnace; and

a X-ray sensing unit provided at the outside of the thin film deposition furnace and sensing the X-ray reflected from the thin film deposition substrate through the X-ray extraction window,

the X-ray irradiation unit comprising a X-ray source for emitting a divergent X-ray, and a curved monochromator for at least converting the divergent X-ray emitted from the X-ray source into a monochromatic X-ray and for allowing the monochromatic X-ray to converge on the thin film deposition surface of the thin film deposition substrate.

7. A thin film deposition system according to Claim 6 wherein, on the premise that the rocking curve is measured based on the data from the X-ray sensing unit using as a

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measuring object a thin film having a mixed crystal structure or superlattice structure formed on the surface of the thin film deposition substrate having a known Bragg's angle, the X-ray irradiation unit has a mean X-ray incident angle for allowing the X-ray to impinge on the thin film on the surface of the thin film deposition substrate with an angle set at around the known Bragg's angle.

8. A thin film deposition system according to Claim 6 wherein, on the premise that X-ray reflectivity is measured, the X-ray irradiation unit has a X-ray incident angle for allowing the X-ray to impinge on the thin film on the surface of the thin film deposition substrate with an angle set at a low angle range required for measuring X-ray reflectivity.

9. A thin film deposition system according to Claim 6 comprising a control unit for controlling, by previously storing desired basic information for forming a thin film in the thin film deposition furnace, at least deposition and measurement of the thin film formed on the surface of the thin film deposition substrate based on the basic information.

10. A thin film deposition system comprising:  
a sealed thin film deposition furnace;  
thin film substance generating means for generating  
thin film deposition particles of the thin film substance  
in the thin film deposition furnace;  
substrate supporting means for supporting a thin film  
deposition substrate in the thin film deposition furnace at  
a position for allowing the thin film deposition particles  
of the thin film deposition substance generated from the  
thin film substance generating means to adhere on the  
surface of the substrate;  
a measuring unit provided at a prescribed site  
communicating with the thin film deposition furnace, and  
being capable of disposing the thin film deposition  
substrate that serves as a thin film deposition sample  
substrate as a measuring object at a position for allowing  
the thin film deposition particles of the thin film  
substance flowing in from the thin film deposition furnace  
to adhere on the substrate;  
a X-ray incidence window and extraction window  
provided on the side walls of the measuring unit;  
a X-ray irradiation unit provided at the outside of  
the thin film deposition furnace and irradiating a X-ray  
through the X-ray incidence window toward the surface of  
the thin film deposition sample substrate disposed within

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the X-ray irradiation unit comprising a X-ray source for emitting a divergent X-ray, and a curved monochromator for at least converting the divergent X-ray emitted from the X-ray source into a monochromatic X-ray and for allowing the monochromatic X-ray to converge on the thin film deposition surface of the thin film deposition sample substrate.

11. A thin film deposition system according to Claim 10 comprising exchange means for a thin film deposition sample substrate for exchanging the thin film deposition sample substrate or the surface thereof disposed in the measuring unit without changing the atmosphere in the thin film deposition furnace.

12. A thin film deposition system according to Claim 10 wherein, on the premise that the rocking curve is measured as a measuring object based on the data from the X-ray sensing unit using a thin film having a mixed crystal structure or superlattice structure formed on the surface

of the thin film deposition substrate having a known Bragg's angle, the X-ray irradiation unit has a mean X-ray incident angle for allowing the X-ray to impinge on the thin film on the surface of the thin film deposition substrate with an angle set at around the known Bragg's angle.

13. A thin film deposition system according to Claim 10 wherein, on the premise that X-ray reflectivity is measured, the X-ray irradiation unit has a X-ray incident angle for allowing the X-ray to impinge on the thin film on the surface of the thin film deposition substrate with an angle set at a low angle range required for measuring X-ray reflectivity.

14. A thin film deposition system according to Claim 10 comprising a control unit for controlling, by previously storing desired basic information for forming a thin film in the thin film deposition furnace, at least forming of the thin film and measurement of the thin film formed on the surface of the thin film deposition substrate based on the basic information.

thin film deposition and thin film measurement

15. A thin film deposition system comprising:

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1. The first part of the report, which is the most important, is the introduction. This part should be written in a clear and concise manner, and should provide a brief overview of the entire report.

substrate supporting means for supporting a thin film deposition substrate in the thin film deposition furnace at a position for allowing the thin film deposition particles of the thin film deposition substance generated from the thin film substance generating means to adhere on the surface of the substrate;

a shield member facing the surface of the thin film deposition substrate supported in the thin film deposition furnace;

a thin film deposition opening formed at a part of the shield member and for allowing a part of the thin film deposition substrate to expose so that the thin film deposition particles of the thin film deposition substance generated from the thin film substance generating means are adhered on the exposed part;

a sample thin film deposition opening formed at another part of the shield member and for allowing another part of the thin film deposition substrate to expose so that the thin film deposition particles of the thin film

deposition substance generated from the thin film substance generating means are adhered on the another exposed part;

rotary drive means for relatively changing a part of the surface facing the sample thin film deposition opening by allowing the thin film deposition substrate to rotate;

a X-ray irradiation unit disposed at the outside of the thin film deposition furnace and irradiating a X-ray through the X-ray incidence window and the sample thin film deposition opening toward a part of the surface of the thin film deposition substrate supported in the thin film deposition furnace; and

a X-ray sensing unit disposed at the outside of the thin film deposition furnace and sensing the X-ray reflected from a part of the surface of the thin film deposition substrate through the sample thin film deposition opening and the X-ray extraction window,

the X-ray irradiation unit comprising a X-ray source for emitting a divergent X-ray, and a curved monochromator for at least converting the divergent X-ray emitted from the X-ray source into a monochromatic X-ray and for allowing the monochromatic X-ray to converge on the thin film deposition surface of the thin film deposition sample substrate.

16. A thin film deposition system according to Claim

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15, wherein the rotary drive means allows the thin film deposition substrate to rotate for every each or plural processes for depositing each thin film layer formed on a part of the surface of the thin film deposition substrate through the thin film deposition opening, in order to change a part of the surface facing the opening for the sample thin film deposition substrate.

17. A thin film deposition system according to Claim 15 wherein, on the premise that the rocking curve is measured based on the data from the X-ray sensing unit using as a measuring object a thin film having a mixed crystal structure or superlattice structure formed on the surface of the thin film deposition substrate having a known Bragg's angle, the X-ray irradiation unit has a mean X-ray incident angle for allowing the X-ray to impinge on the thin film on the surface of the thin film deposition substrate with an angle set at around the known Bragg's angle.

18. A thin film deposition system according to Claim 15 wherein, on the premise that X-ray reflectivity is measured, the X-ray irradiation unit has a X-ray incident angle for allowing the X-ray to impinge on the thin film on the surface of the thin film deposition substrate with an

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